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THE ZOOLOGICAL RESULTS OF THE
"CHALLENGER" EXPEDITION

Report on the Scientific Results of the Voyage of H.M.S. "Challenger" during the Years 1873-76 under the Command of Capt. G. S. Nares, K.N., F.R.S., and Capt. F. T. Thomson, R.N. Prepared under the Superintendence of the late Sir C. Wyville Thomson, F.R.S., &c., and now of John Murray, one of the Naturalists of the Expedition. Zoology—Vols. XI., XII., and XIII. By N. Poléjaeff, M.A., P. Herbert Carpenter, D.Sc., Frank E. Beddard, M.A., Prof. William C. McIntosh, Edgar A. Smith, Dr. E. Selenka, and Prof. G. O. Sars. (Published by Order of Her Majesty's Government, 1885.)

DURING 1885 three new volumes of the Zoological Series of Reports have been published. Of these, Part 32 of Vol. XI., "On the Stalked Crinoidea," by Dr. P. Herbert Carpenter, has already been noticed in our pages (NATURE, vol. xxxi. p. 573). The others we now proceed to notice.

Part 31 is a "Report on the Keratosa," by N. Poléjaeff, M.A., of the University of Odessa. The Keratose sponges do not belong to the deep-sea fauna. It is therefore not to be wondered at that the total number of species collected during the cruise of the *Challenger* should have been only 37. It is, however, a little surprising that of this number 21 should be new. The collection embraced forms belonging to almost all the genera of the Keratine sponges hitherto distinguished, and the specimens were for the most part well preserved.

The Report opens with a chapter on the organisation and classification of the group. The subject of the classification of the group is undeniably a difficult one. In no section of the animal kingdom is there a greater danger of describing individuals instead of genera and species. The student has no palaeontological data to refer to; embryological details so far as these are known do not help him much; minute anatomy gives but few distinctive characters, and so he is obliged to depend on general anatomical details. When the author acknowledges, as he freely does, that this is so, one is not surprised to find the writers of the past—Duchassaing and Michelotti, Gray, Hyatt, and Carter—depending for their divisions on the properties of the skeleton; nor does one wonder that in their attempts they so often went astray. The division of the Keratosa into two groups, differentiated by having homo- and heterogeneous skeletal fibres, is characterised as thoroughly artificial. The subject of the presence of filaments is capable of no systematic application (the extremely interesting question of what these filaments are is discussed at length, no definite conclusion being come to; it is strange that they never seem to have been examined by a botanist). The presence of true cells in the walls of the skeletal fibres cannot at present be defined as of systematic value. Dr. Vosmäer's arrangement of a division into families, characterised by the properties of both the skeleton mass and of the soft parts is selected as the best possible for the present.

The history of these families and of the various genera placed therein is written with the greatest care and fair-

ness. In agreeing with Hyatt (1875) that Ceratella and Dehitella of Gray are thoroughly sponge-like forms, and not, as Carter (1873) would have them, "nothing but hydroids or coral-like skeletons," he overlooks the fact that in the *Quarterly Journal of Microscopical Science* for January 1870 it is stated that the Ceratellidæ were undoubtedly a "family of arborescent Keratose sponges." The descriptions of the species are accompanied by ten plates of figures. This able Report concludes with a few pages on the subject of the affinities of the group.

Mr. Herbert Carpenter's "Report on the Crinoidea" forms Part 32, and is followed by a "Report on the Isopoda" (part 1), by Mr. Frank E. Beddard, forming Part 33 of the series. This portion of Mr. Beddard's Report relates to the genus *Serolis*, which occupies a foremost place among the Isopods collected. Of the 16 species collected nine are new. A discussion of the systematic position of the genus within the order Isopoda is postponed until the next Part of the Report, but with regard to the alleged affinity of the genus and of the Isopods generally to the extinct Trilobites, as insisted on by A. Milne-Edwards, the author has nothing to add to what has already been said; the examination of the species found during the *Challenger* Expedition having brought to light no facts which tend to show any close resemblance between the two groups. Of the 22 known species all but four are found at a depth of from 5 to 150 fathoms. Of the four deep-sea forms one is found at a depth of 675 fathoms, a second at depths between 400 and 1600 fathoms, a third between 400 and 1975 fathoms, and a fourth at depths of 600 and 2040 fathoms. In the two species from the latter depth the genus attains to its greatest size. It has evidently had its origin in the Southern Hemisphere, probably around the shores of the south polar continent. While the great majority of the species live in shallow water, the deep-sea forms are in all cases strongly marked; they also show certain peculiarities, notably in the structures of their eyes, which are often absent, but, when present, show great evidence of functional degeneration; indeed none of the deep-sea species possess well-developed eyes. The eye-structure of some of the species is given in great detail and is well illustrated on Plates IX. and X. Ten plates accompany this memoir.

Part 34 of the Zoological Series forms Vol. XII., a portly volume of over 550 pages illustrated by 93 plates. This valuable Report is by Prof. William C. McIntosh. It is on the Annelida Polychæta, and marks quite an era in the history of this group. In a short notice it is impossible to do justice to this laborious work, and we must content ourselves with briefly marking our admiration of the care and research that have been bestowed upon it. Of the species collected no less than 220 are described as new. It is noteworthy that the formation of no new family was required; all the forms fall into groups already constituted, and which have been so satisfactorily diagnosed by Malmgren that the diagnoses have not here been repeated, but a most useful synopsis of the families, genera, and species described is appended to the Report, with references both to the pages and plates. In many cases the food of the Annelids has been examined, and in the case of abyssal forms, it throws some light on the food-resources of the great depths of the oceans. In the North Atlantic Region a large number of forms

occur, and relatively few range to other areas, but this apparent distinctness in so vast a region is probably due to the comparatively unexplored condition both of it and the other oceans. Most of the genera are cosmopolitan in their range, but the remarkable new genus *Buskiella* is entirely confined to the abysses (2025 fathoms) of this and the South Atlantic. In the South Atlantic Region the two chief centres for specimens were the coast of Brazil and the Cape. In the South Indian Region one of the most striking features was the large proportion of species pertaining to Kerguelen. The abundance of Annelids in the deep water of the land-locked bays of this island was remarkable, and many new forms are described therefrom. In the Australian Region the types found were in many cases peculiar and novel ; here the branched Syllis, one of the most remarkable discoveries of the Expedition, was found. In the Japanese Region a series of remarkable types were found, while comparatively few came from the North Pacific, and the majority of the specimens from the South Pacific came from the confined waters of the Straits of Magellan.

In regard to bathymetrical distribution, the greatest number of species occurred in the shallow water, 10 fathoms and under. The two regions ranging from 10 to 50 and from 50 to 100 fathoms have each about the same number of Annelids, and both are similar in respect to new forms. In the depth between 100 and 200 fathoms the number was less, but the proportion of new forms was much higher ; while in depths between 200 and 500 fathoms almost all the forms were new, and many belonged to new and remarkable genera ; between 500 and 600 fathoms the number fell to less than half that in the previous group, but the majority were new. The number found between 600 and 1000 fathoms include two known species out of a list of 14. The four species occurring between 1000 and 1200 fathoms are new. Those species found between 1200 and 1500 fathoms are more than five times as numerous as the last, and include only five known forms, most of which, however, are found in shallow water as well as at this great depth ; between 1500 and 2000 fathoms all the species were new. The same is true of those between 2000 and 2500 fathoms ; while in the lowest depths, between 2500 and 3000 fathoms several known forms occurred. The majority of the deep-sea forms are tube-dwellers.

Vol. XIII. opens with Part 35, Mr. Edgar A. Smith's "Report on the Lamellibranchiata." On the return of the Expedition all the Mollusca were placed in the hands of the Rev. R. Boog Watson for description, but after separating out the different species, and labelling the greater part of the known forms, Mr. Watson, seeing the immense extent of the collection, determined to limit his descriptive work to the Gasteropoda and Schaphopoda, and Mr. Edgar A. Smith then consented to prepare the "Report on the Bivalves." The author apologises for not using the name Pelecypoda for this group, urging that it has not only priority but also is more in conformity with the names in use for the other classes. When in 1824 De Blainville first used the term Lamellibranchs, though it is true the class for which it was used was not characterised, still the genera placed under it were so well-known, that the name itself may be said to carry its own explanation, and this might fairly secure the priority for

a well-known and almost universally accepted name, which in part by accident it would seem is used in this important Report.

In many respects the collection of Lamellibranchs was disappointing. Only some 500 species were obtained, and of these five were represented by a long series of specimens, and in many cases the species were represented by only detached or single valves. When great depths were reached some of the forms found were of particular interest, but it is a remarkable fact that only one distinctly new generic type was discovered. The greatest depth at which Lamellibranchs were found was in the mid North Pacific Ocean at 2900 fathoms, but two species, *Semele* (*Abra*) *profundorum*, n.sp., and *Callocardia pacifica*, n.sp., were found. Some of the species are noted as found not only at widely distant localities but also at very different depths. The Lamellibranch fauna of the deepest parts of the Atlantic and Pacific Oceans is not of a very extraordinary and certainly not of a special character, and it would appear clear that the deeper the dredgings the fewer the species found. The memoir is illustrated by 25 plates, executed in a very creditable manner by the Cambridge Scientific Instrument Company.

Part 36 is a "Report on the Gephyrea," by Dr. E. Selenka, the well-known Professor of Zoology in the University of Erlangen. The number of species (28) collected was small, and they belonged to known genera ; 10 were undescribed. The habitat and distribution of some are of special interest ; forms previously known as littoral have been dredged from great depths ; it would appear probable that the tube-inhabiting Gephyrea occur especially at the greater depths, where as yet has been found only a single example of the free-living forms. Four plates illustrate this Report, on one of which the strange male of *Bonellia viridis* is figured, with its till now overlooked curious segmental organs.

Part 37 is a "Report on the Schizopoda," by Prof. G. O. Sars, of Copenhagen. The collection made turned out extremely rich and of very special interest, containing several most remarkable new types, and greatly increasing our knowledge of the morphology and affinities of the group. In an introductory note the subject of terminology is dwelt on ; in a note on the morphology of the group the author decides for the present to "assign to this group the rank of a distinct tribe or sub-order of Decapoda." This sub-order occupies as it were the most primitive position within the division of the Podophthalmia, containing apparently the least modified forms, in which the original characters distinguishing the progenitors of the whole division would seem to exhibit least change.

In an appendix to the Report some interesting details are given of some ecto- and endo-parasites found in the Schizopods ; 38 plates, drawn by the author with the aid of the camera lucida, represent all the new species ; the drawings are very highly finished, and have been clearly and beautifully printed. It may be noted that the new genera and species described in the Report were briefly characterised by the author in the *Transactions of the Christiania Scientific Society* for 1883.

We have pleasure in again noticing that these splendid contributions to zoological knowledge have been edited and seen through the press with wonderful expedition and accuracy by Mr. John Murray, whose labours as Editor now seem coming to a close.